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(c) And so on for all other values of p , q , and m .

Mr. Gruber sent in three different solutions, and Mr. D. B. Northrup, of Mandana, N. Y., sent in the results for tracts in the form of (1) circle, (2) square, (3) rectangle sides as 2:1, (4) a triangle ratios of side 6:6:7, and (5) an ellipse having a major-axis double the minor-axis. Other very simple solutions of the problem are possible when the tract is in the shape of a square, but the solutions above are quite sufficient for all purposes. ED. F.

136. Proposed by F. M. PRIEST, Mona House, St. Louis, Mo.

What is the size of the smallest cubical box, inside dimension, that will contain four balls each ten inches in diameter?

Solution by H. N. DAVIS, (Brown University), 159 Brown Street, Providence, R. I.

Let the base of the box be of such a size that two of the balls when placed with their centers along a diagonal will be tangent to each other and to the sides of the box. Let their centers be C and C' , the diagonal AD , and the center O .

Draw BC perpendicular to AE . Then $AB=BC=r=5$.

$$\therefore AC=5\sqrt{2}.$$

$$AO=5\sqrt{2}+CO=5\sqrt{2}+r=5\sqrt{2}+5.$$

$$AD=10(1+\sqrt{2})=\sqrt{2}AE.$$

$$AE=5\sqrt{2}+10=17.07106 \text{ inches (nearly).}$$

If the second layer of two balls be placed along the other diagonal (at $M+M'$) the position of M with reference to C and the side AF considered as a base will be exactly the same as that of C and C' with reference to AD . The figure may then be taken as an elevation and the height of the box will be exactly equal to its base-edge, and the box will be a cube. Q. E. D.

Good solutions were received from PROF. J. M. STRASBURG, Chicago, Ill., D. B. NORTHRUP, G. B. M. ZERR, and M. A. GRUBER.

ALGEBRA.

112. Proposed by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.

In *Hall and Knight's Higher Algebra* I find the following :

If $a+b+c=0$, then

$$\frac{a^5+b^5+c^5}{5} = \frac{a^3+b^3+c^3}{3} \cdot \frac{a^2+b^2+c^2}{2}; \quad \frac{a^7+b^7+c^7}{7} = \frac{a^5+b^5+c^5}{5} \cdot \frac{a^2+b^2+c^2}{2};$$

and if $a+b+c+d=0$, then

$$\frac{a^5+b^5+c^5+d^5}{5} = \frac{a^3+b^3+c^3+d^3}{3} \cdot \frac{a^2+b^2+c^2+d^2}{2}.$$

QUERY. Is there a general law governing such expressions? Investigate.

I. Solution by HARRY S. VANDIVER, Bala, Montgomery County, Pa.

Consider the following general equation with its second term missing, thus